ION SYSTEMS
An ITW Company

Critical Environment Ionizing Blower

Model 5810i

User's Manual

About ION Systems

ION Systems develops, manufactures, and markets system solutions to manage electrostatic charge. As the world's largest provider of electrostatics management products and services, ION improves its customers' business results by providing a total solution to their electrostatic discharge and electromagnetic interference challenges. ION Systems is a wholly-owned subsidiary of Illinois Tool Works (ITW), and is located in Alameda, California. For more information about ION Systems visit www.ion.com or call 800-367-2452. ION Systems is ISO 9001 and ANSI ESD S20.20 certified.

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Description

1.1 Critical Environment Ionizing Blower Model 5810i

The Critical Environment Ionizing Blower Model 5810i is a steady-state DC overhead ionizing blower for controlling static charge over work areas and in critical spaces. Designed and tested to meet ISO 14644-1 Class 4 (Fed. Std. 209(e) Class 10) cleanroom requirements and the tightest balance specifications, the Model 5810i can achieve an offset balance of ±3V. With the optional sensor and feedback control, the blower will automatically maintain a balance of ±1V for the most critical applications.

This manual describes the features of the Blower and procedures for installation, operation, and maintenance.

1.2 Blower Features

The Model 5810i is available in three lengths and two finishes.

Lengths	No. of Fans	Finishes
32 in. (81.3 cm)	2	White finish aluminum chassis only
40 in. (101.6 cm)	3	White finish aluminum chassis only
44 in. (111.8 cm)	3	Stainless steel chassis only

Table 1. Model 5810i Feature Configuration

Several other feature configurations are available to suit your environment. The following features are standard (see the figure below):

- **Balance adjust:** one adjustment control per fan adjusts positive and negative ion output.
- **Green power on LED:** lights when power is applied and the fan control rocker switch is set to low or high.
- **Red alarm LED:** lights when the unit is in alarm.
- **Daisy-chain output:** 100-240 VAC, 50-60 Hz, 5A maximum.
- **Power input:** 100-240 VAC (±10%), 50/60 Hz, 28W maximum.
- **Fan control rocker switch:** three-position switch turns the fan speed to low, high, or off.

Figure 1. Controls/indicator Lights on Standard 5810i (located on the side)

1.3 Options

The Model 5810i blower may be configured with the following optional features:

- Audible alarm (99-5810i-AALARM)
- Sensor input connectors
- FMS connector (4-20 current loop); FMS output connector is available only with the sensor input connector feature
- Auto-Clean System (99-8500i-PNFFAN)
- Power cord lock (99-5810-SCORDLK)

Figures 2 and 3 show the controls with options.

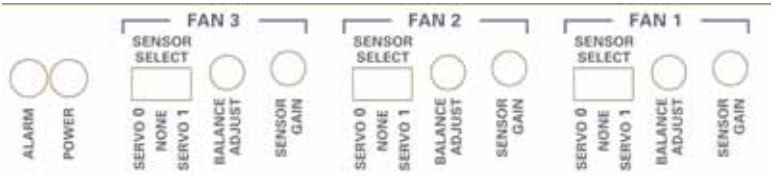

Figure 2. Controls With Sensor Option Configuration

Figure 3. Connections with Sensor and FMS Option Configuration

1.4 External Sensor Options

The Model 5810i ionizer can operate with a Novx Series 7000, Novx Series 3350/3360 or Novx Series 3150, to detect and automatically correct the offset balance. An external sensor is needed to allow the Blower to provide ±1V balance. The sensor antenna is placed at the target and feedback is sent to the Model 5810i's internal control system.

Novx Process Monitor
Series 7000

Novx Passive/Active Detection
System Series 3350/3360

Novx Single-fan
Ionizer Controller
Series 3150

Figure 4. Sensor Options

1.5 Performance

The Model 5810i Blower is factory adjusted to meet the performance specification described below. However, performance in different environments may vary. After installation, the unit should be adjusted in the operating environment for optimum performance. For instructions, refer to the 2.7 **Balance Adjustment** section of this manual.

The Model 5810i Blower has a typical static discharge time of three seconds or less directly under the center of each fan. Measurements were taken 18 inches (457 mm) away from the Blower at high speed using a charged plate monitor in accordance with ESD Association ionization standard ANSI/ESD STM3.1-2000.

In a humidity-controlled environment, the unit maintains a balance of ±3V or better. The balance adjustment controls allow for ionization offset adjustment to zero volts.

Performance with Sensors

With external sensors connected to the Blower, a balance of ±1V or better can be maintained.

1.6 Power Requirements

The Model 5810i Blower requires an input voltage of 100-240 VAC 50/60 Hz (±10%).

The input power is 28W maximum.

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Setup & Operation

2.1 Mounting

Caution:	To reduce the risk of electric shock, this equipment has a grounding-type plug with a third (grounding) pin. This plug will only fit into a grounding-type power outlet. Do not alter the plug in any way. If the plug does not fit into the outlet, contact qualified personnel to install the proper outlet. For safety, the use of extension cords is not recommended.

When determining the mounting location for the Blower, keep in mind the following:

- Mounting the Blower to ceilings or other structures must follow applicable building code requirements.
- To enhance uniform discharge performance, install the Blower a minimum of 24 inches (609 mm) above the work surface.

The Blower is easily mounted using eye-bolts and S-hooks (supplied) and chain or cable as required by the particular installation. Using the S-hooks between the unit and the chain or cable allows easy access and removal of the unit for maintenance.

Optional U and L mounting brackets are available; see **Chapter 5 Specifications** for part numbers.

Figure 5. Typical Installation with S Hooks

1. Screw the eye-bolts or other optional bracket (U-bracket or L-bracket) in the 8-32 threaded inserts on the top of the chassis. If using an optional U-bracket or L-bracket, arrange the bracket to suit your installation.
2. Insert the S-hooks into the eye-bolts or optional bracket.
3. Attach one end of the chain or cable (not supplied by ION Systems) to the S-hooks, and the other end to the ceiling or other mounting structure.

2.2 Daisy-Chain Connections

The Model 5810i Blower may connect with other Model 5810i Blowers (daisy-chain) in series using the female AC outlet provided on one end of the Blower. This outlet has a maximum rating of 5A. Up to 10 Blowers may be connected together.

Use an 18 AWG power cord 12 inches (304 mm) or less in length to connect the daisy-chained Blowers together. Contact ION Systems to order power cords.

Figure 6. Daisy-chain Outlet

2.3 Ground Jack Connection

The ground jack offers a convenient, built-in connection for optional grounding of test equipment. A standard banana-type plug is used to connect to the jack. See Figure 5 Daisy-chain Outlet on page 12.

A ground connection through this jack is not required for the proper operation of the Blower.

2.4 Operating Environment

It is important to become familiar with the environmental and power needs of the Model 5810i Blower before applying power. Operating the Blower in the correct environment will ensure the best performance with minimal maintenance.

Humidity

Operate the Blower in an environment where humidity is 30-70% (non-condensing). Excess humidity levels may cause the unit to operate incorrectly.

Temperature

The operating temperature range for the Blower is 50-90°F (10-32°C).

Caution:	Do not use this Blower in an explosive environment! Poorly maintained ionizers may produce minuscule electric arcs at the emitter points. This may cause detonation in an explosive environment.

2.5 Power Connections

Plug the supplied power cord into a properly grounded 100-240 VAC 50/60 Hz receptacle. Plug the other end into the power plug receptacle at one end of the Blower.

Figure 7. Power Plug Connector

Power Cord Locks (Optional)

If your unit features an optional cord lock bracket, loosen the Phillips retaining screw on the bottom part of the bracket and slide the power cord into the bracket. Retighten the bracket screw.

If your unit features the secure cord lock option, use a #4 drilled spanner driver tool to loosen or tighten the retaining screw on the cord lock bracket.

Figure 8. Unit with a Power Cord Lock Bracket

2.6 Turning on the Blower

Use the “Fan Control” rocker switch at one end of the Blower to turn it on to high or low speed. (High II, off O, and low I).

Note:	When power is initially applied, the red alarm LED will light for a moment.

When the fan control rocker switch is set for high or low, the green power indicator will light and the fans will operate.

2.7 Balance Adjustment

Note:	These instructions are for use by qualified personnel only. To avoid personal injury or damage to the equipment, do not perform any maintenance other than that contained in these instructions.

Balance adjustment is an important part of setup, operation, and maintenance for your Blower. Balance adjustments should be performed as part of regular operation and maintenance.

Required Equipment:

- Charged plate monitor (CPM), conforming to ESD STM 3.1-2000 (ION Systems Model 280A recommended), with a 6 x 6 inch (152 x 152 mm) target plate.
- Small flat-blade screwdriver or trimpot adjusting tool.

There is a direct relationship between the distance the Blower is installed from the work surface, the area of coverage, and the discharge time measured at the work surface. Generally, the greater the mounting distance from the work surface, the greater the area of coverage will be, and the longer the discharge time will be.

Note:	Set the unit to the desired fan speed before adjusting the balance.

Each fan in the Blower is adjusted independently. Use one CPM per fan. Place three CPMs on a grounded, static-dissipative work surface directly below and in-line with the center of each fan. In addition, make sure of the following:

- The standard distance between the target plate of the CPM and the Blower is 18 inches, ±1 inch (457 mm, ±25.4 mm). There should be no objects in the work area between the CPM and the Blower.
- The standard distance between the bottom of the Blower and the grounded, static-dissipative work surface is 24 inches, ±1 inch (609 mm, ±25.4 mm).

- The airstream from the Blower is directed at the target plate of the CPM.
    1. Refer to the instruction manual of your charged plate monitor for specific operating instructions. Turn on the CPM and allow a five to fifteen minute warm up period.
    2. Disconnect any external sensors from the Blower and set all sensor on/off switches to None.
    3. Ground the CPM target plate and zero the CPM.
    4. Using a small flat-blade screwdriver or trimpot adjusting tool, turn the “Balance Adjust” trimpots (see Figure1) either clockwise for a more (+) balance or counter-clockwise for a more (-) balance. Adjust the balance of each fan in the following order: Center fan, left fan, right fan, and then center fan again. Carefully adjust the appropriate Balance Adjustment control on the Blower until the CPM target plate voltage reads 0 volts (±3V). See the figure below.

Contact ION Systems Technical Support (techsupport@ion.com) with any questions regarding balance adjustment.

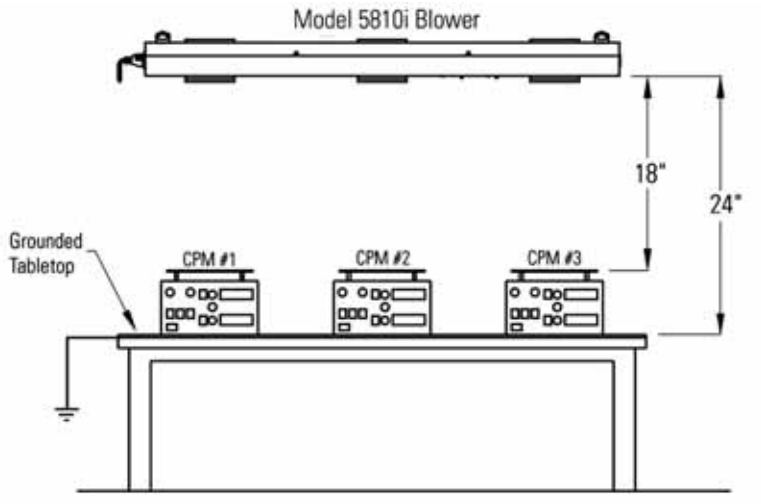

Figure 11. Adjustment Setup

2.8 Sensor Connection & Operation Option

If your unit features the sensor input option, an RJ-11 receptacle is provided for each fan.

Note:	If your unit features the sensor input option and you are not operating sensors with your Blower, make sure that all "Sensor Select" switches are set to None for each fan.

Sensor Types

Use only an ION Systems approved and recommended sensor manufacturer. ION Systems offers a product bulletin that recommends approved sensor types, setup, maintenance, and positions. Use this bulletin together with these instructions. The type of sensor used will depend on your application needs. Contact ION Systems for a sensor type recommendation and for the product bulletin.

The RJ-11 receptacles for each fan sensor input use the following pin designations:

Pin	Pin Function
1	No connection
2	+24 VDC @ 100 mA Max. output
3	Power ground
4	Signal ground
5	Sensor signal input
6	No connection

Table 2. Sensor Input RJ-11 Pin out Designations

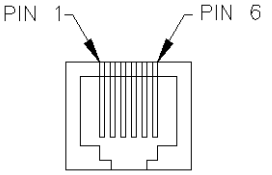

Figure 12. Sensor Input Pinout Designations for Fans 1-3

Sensor Setup

1. Connect the sensors to the appropriate fan sensor input.

Figure 13. Three-fan Unit with Sensor Inputs

Figure 14. Close Up of Sensor Inputs for Fans 1-3 on a 3-fan Unit

2. For each fan, use a small flatblade screwdriver to slide the "Sensor Select" switch on the Blower to either Servo 0 or Servo 1, depending on the manufacturer of the sensor (contact ION Systems for information about sensor manufacturers).

Note:	If you plan to operate the Blower without sensors connected, make sure that all “Sensor Select” switches are set to None for each fan.

Figure 15. Sensor Select Switch

3. Position the sensors at the desired target and follow the setup and operating instructions provided by the sensor manufacturer.
4. Perform a sensor verification test, described in the section below.

Sensor Verification Test

After the Blower and the external sensors have been set up, test the sensors with the following performance verification. Use a charged plate monitor (CPM) located next to the sensor to perform the verification.

1. Use a small flatblade screwdriver to slide the "**Sensor Select**" switch to None and disconnect the sensor input cables from the Blower.
2. Use a Novx Series 7000, Series 3350/3360 voltage display or Calibrator_Reader, CPM or similar device for the following procedure:

   Use the Balance Adjust control on the Blower to offset the balance of each fan to approximately +20 or -20V.
3. For each fan, slide the "**Sensor Select**" switch back to either Servo 0 or Servo 1 (depending on the sensor type) and reconnect the sensor input cables to the Blower.

The offset balance shown at the external sensor should now be automatically corrected back down to a zero reading. With a distance of 18-24 inches (457-609 mm) between the Blower and the sensor, at high fan speed, this correction should typically take less than 18 seconds.

Resetting the "Sensor Select" switches to None, cycling the Blower off and then on should once again produce the forced ±20V CPM offset reading from step 2 above.

4. At the end of this test, disconnect the sensor input cables from the Blower and slide the "Sensor Select" to None. Use the Balance Adjust for each fan to control to re-zero the Blower to an offset voltage of 0 volts (±1V).
5. With the Blower adjusted for 0 volts offset, set the "Sensor Select" switches for each fan to either Servo 0 or Servo 1 (depending on the sensor type) and reconnect the sensor input cables.

Note:	Due to the operating differences between sensors, it is always best to perform a physical disconnection/reconnection of the sensor input cable while performing discharge verification testing. Do **not** use the sensor on/off slide switch for this function.

Sensor Operation

Note:	If your unit features sensor input connectors and you are not operating sensors with your ionizer, make sure the “Sensor Select” switch is set to **None** for each fan.

Sensor Gain

The Sensor Gain control is factory set and should not require adjustment. If, after following the sensor manufacturer’s setup and installation instructions, you are still unable to achieve the desired Blower performance, contact ION Systems Technical Support (techsupport@ion.com).

2.9 FMS Connection Option

Your unit may feature the optional 4-20 mA current loop RJ-11 receptacle interface for connection to a facility monitoring system (FMS). The FMS output provides the following condition states:

State	Signal at Connector
No power applied	0 mA
Normal status	4 mA
Alarm condition	20 mA

Table 3. FMS 4-20 mA Loop Status Conditions

Figure 16. FMS Output Pinout Designations

Pin	Pin Function	Pin	Pin Function
1	No connection	4	(+) I current loop
2	No connection	5	(-) I current loop
3	No connection	6	No connection

Table 4. FMS 4-20 mA Pin Designations

If your FMS system is interfaced to a Novx Series 7000, 3350/3360, or 3150 sensor, the blower FMS connection should be made to the Novx control box as per Tables 5 and 6.

Series 7000 Interface Cable	Connect From		Connect To
Novx 4-20 mA to 10 pin Decoder, P/N/ 33-7000-x	Control Box jack labeled “FMS OUT”	⇨	Novx Series 7000 “AUX”

Table 5. Novx Series 7000 Connection

Series 3150/3350/3360 Interface Cable	Connect From		Connect To
Novx 4-20 mA to 6 pin Decoder, P/N 33-7021-x	Control Box jack labeled “FMS OUT”	⇨	Novx 3150 Ionizer Feedback, or Novx Series 3350/60 "DI/O

Table 6. Novx Series 3150, 3350/3360 Connection

3

Maintenance

3.1 Alarms

The red alarm LED, located on the side of the Blower next to the green power LED, lights when an alarm condition occurs. If your Blower features an optional audible alarm, it will also sound. The alarm is not a maintenance alarm.

An alarm condition may be caused by any of the following:

- A failed high voltage power supply
- Absence of ionization at emitter points
- Failure to maintain balance
- No power to fan (fan unplugged)
- Fan in locked-rotor condition

For information on troubleshooting alarms, see the **Troubleshooting** section at the end of this chapter.

3.2 Maintenance Scheduling

Regularly scheduled ionizer maintenance extends the life of the unit and allows continued, efficient delivery of ionization. It is important to develop a schedule that meets the requirements for your environment and installation. In general, equipment should be checked on a monthly basis to ensure it is operating as originally adjusted.

Maintenance involves regular balance adjustment, periodic cleaning of the exterior chassis, and emitter point inspection, cleaning, and replacement if necessary. The performance of the Model 5810i Blower is designed to be maintained primarily by internal feedback circuitry.

For maintenance services performed by ION Systems, contact ION Systems Technical Support (techsupport@ion.com).

Caution:	Turn off the Ionizer and disconnect the power cord before performing any maintenance procedures on the unit.

Recommended Cleaning Materials:

- Cleanroom-compatible cleaning cloths
- Cleanroom-compatible cloth swabs (polyester cloth is recommended)
- Cleaning solution of 50% IPA (electronic-grade isopropanol alcohol)/50% de-ionized water or ION Systems Emitter Point Cleaner (ION Systems part number 22-1000)
- Ionizing air gun, such as ION Systems Model 6115 AirForce Gun

3.3 Emitter Point Inspection and Cleaning

Emitter point maintenance ensures continued optimum performance from Ionizers. Emitter point wear can be caused by a number of environmental factors, including airborne molecular contaminates.

It is important to create a schedule for periodic inspection of emitter points. Schedules may vary depending on your application. Emitter point inspection and cleaning is recommended every one to three months, and replacement every twelve to eighteen months or when damage or wear is evident.

Emitter Point Inspection

Emitter points should be checked regularly for wear or dirt on the tips of the points. This picture shows a worn emitter point with dirt accumulated on the tip.

Emitter Point Cleaning

Ensure that the Blower is disconnected from power before cleaning the emitter points.Cleaning energized emitter points may result in additional contamination.

To clean the emitter points and the area around the emitter points, moisten a cleanroom-compatible swab or cleaning cloth with the 50% IPA solution, or use ION Systems Emitter Point Cleaner. Gently rotate the swab or cleaning cloth around the emitter point until dirt or debris is removed.

3.4 Using the Auto-Clean System (Option)

The Auto-Clean System features a brush mechanism that sweeps the emitter points when the blower is turned off and on, removing accumulated residue from emitter points. To use the Auto-Clean System:

1. Remove any contamination-sensitive objects below the blower before activating the Auto-Clean System.
2. Turn off the blower. The Auto-Clean System brush will extend as the fan slows to a stop.
3. Allow the fan to come to a complete stop and then turn the blower back on. Wait three minutes for any loose particles to disperse.

Activate the Auto-Clean System regularly to prevent excessive build up of debris. ION Systems recommends activating the Auto-Clean System at least once a week. Cleaning schedules will vary depending on environmental conditions and application requirements.

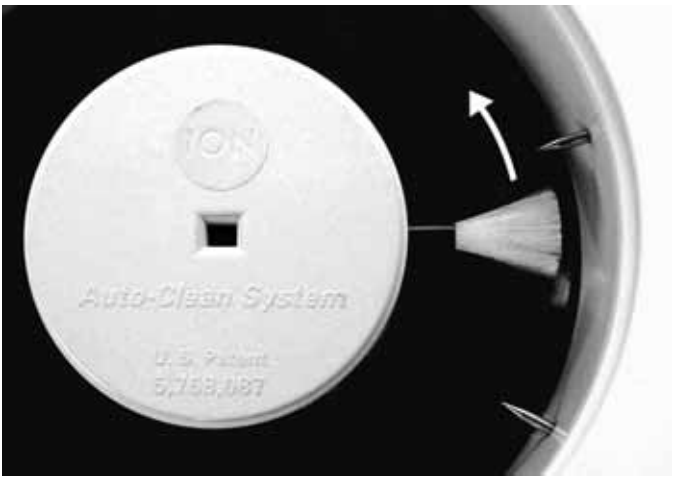

Figure 17. Auto-Clean System Option

3.5 Balance Adjustment

Balance adjustment is a necessary and regular part of operation of maintenance for the Model 5810i Blower. The Blower must be balanced after making adjustments to any settings, or adding or removing optional sensors.

Perform a balance adjustment according to the steps in the 2.7 **Balance Adjustment** section as a regular part of maintenance.

3.6 Fan and Fingerguard Cleaning

Move the Blower to a designated maintenance area. Use clean, dry air (CDA) with an ionizing air gun to blow off the fan blades and fan guards.

3.7 Cleaning the Chassis

Moisten a cloth with the 50% IPA solution. Use the cloth to wipe down the chassis and remove any dirt which may have accumulated on the chassis. Change the cloth frequently to make sure that the dirt is completely lifted.

3.8 Troubleshooting

The table below provides a quick troubleshooting reference for the Model 5810i. If any of the solutions listed do not remedy the problem, contact ION Systems Technical Support (techsupport@ion.com).

Problem	Possible Cause	Solution
Fans are noisy or slow	Fans are obstructed	Check fan guards for any obstructions
Fans do not operate	Poor power connection or fans are obstructed	Check power cords and connections or check fan guards for obstructions
Offset balance is > ±3V	Balance adjustment is required or emitter points are dirty	Clean the emitter points and then perform a balance adjustment
Decay times are too long	Balance adjustment is required or emitter points are dirty	Clean the emitter points and then perform a balance adjustment
Alarm flashes on intermittently	Emitter points are dirty	Clean the emitter points
Alarm is on continuously	HV failure or fan failure	Contact ION Systems for service

Table 7. Troubleshooting Table

4

Specifications

4.1 Specifications

Ion Emission	Steady-state DC
Emitter Points	ISO Class 4 (Fed. Std. 209(e) Class 10) titanium, 8 per fan
Airflow Volume	114 cfm per fan (typ)
Audible Noise	High fan speed 62 dB (typ); low fan speed 51 dB (typ); measurements taken at 12 inches (304 mm) from fan
Input Voltage	100-240 VAC (±10%), 50/60 Hz
Input Power	28W max
Output Voltage	100-240 VAC, 50-60 Hz unfused, 5A max
Operating Temp	50-90°F (10-32 °C)
Humidity	30-70% RH (non- condensing)
Ozone	0.02 ppm or less
Cleanliness Rating	ISO 14644-1 Class 4 (Fed. Std. 209(e) Class 10)
Indicators	Visual green power on LED, red alarm LED; optional audible alarm
Controls	Balance Adjust trimpot (1 per fan); 3-position fan control switch (high/off/ low); Sensor Gain trimpot (1 per fan, optional); slide switch for sensor type or no sensor (optional), 1 per fan
Chassis	Model 5810i aluminum with epoxy-polyester powder coat; Model 5810is stainless steel (in 44 in. only)
Mounting	Eye-bolts and S-hooks provided (other brackets available)
Daisy-chain Capability	Maximum of 10 units; power cord (18 AWG) between units should not exceed 12" (304 mm) in length
Options	Sensor input RJ-11 connectors (1per fan); FMS 4-20 mA RJ-11 output (available with sensor option only); audible alarm; cord lock; Auto-Clean System
Dimensions	3.8H x 6.1D x 32 or 40 or 44L in. (9.6H x 15.5D x 81.3 or 101.6 or 111.8L cm)
Weight	Model 5810i 10.3 lb (4.7 kg); Model 5810is 15.3 lb (6.9 kg) 44 in. version
Certifications	CE TÜV EN 61010-1:2001 RoHS Compliant

4.2 Replacement Parts & Accessories

Contact your ION Systems representative or ION Systems Sales Services department for more information about these replacement parts.

ION Systems P/N	Description
22-1000	Emitter Point Cleaner solution
25-0720	Daisy-chain power cord
32-6405	U-shaped mounting bracket (white aluminum)
32-6406	U-shaped mounting bracket (stainless steel)
32-6409	L-shaped mounting bracket (white aluminum)
32-6410	L-shaped mounting bracket (stainless steel)
99-5810-SCORDLK	Power cord lock (steel black zinc finish)
22-0356	ISO Class 4 (Fed. Std. 209(e) Class 10) titanium emitter points
25-20660	US plug power cable, 8.2 feet (2.5m)
25-0670	US plug power cable, 10 feet (3m)
25-0680	US plug power cable, 15 feet (4.6m)
25-0700	Power cable (no plug), 10 feet (3m)
25-20710	UK plug power cable, 8.2 ft. (2.5m)
25-20735	German-Schuko plug power cable 8.2 ft. (2.5m)

4

Warranty & Service

ION Systems provides a limited warranty for the Critical Environment Ionizing Blower Model 5810i. New products manufactured or sold by ION Systems are guaranteed to be free from defects in material or workmanship for a period of two (2) years from date of initial shipment. ION Systems liability under its new product warranty is limited to servicing (evaluating, repairing, or replacing) any unit returned to ION Systems that has not been subjected to misuse, neglect, lack of routine maintenance, repair, alteration, or accident. In no event shall ION Systems be liable for collateral or consequential damages.

This warranty does not cover emitter points. ION Systems recommends emitter point replacement or servicing every 12-18 months.

To obtain service under this warranty, please contact ION Systems Technical Support.

Notes

Notes

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19-5810i-M-01 Rev 1